

V.  
THE SOUTH AFRICAN GOLDFIELDS.

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SKETCH

OF THE

MINING AND OTHER RESOURCES

OF THE

TRANSVAAL REPUBLIC.

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LONDON:

1893.

# CASTLE LINE

FOR THE GOLDFIELDS OF SOUTH AFRICA.

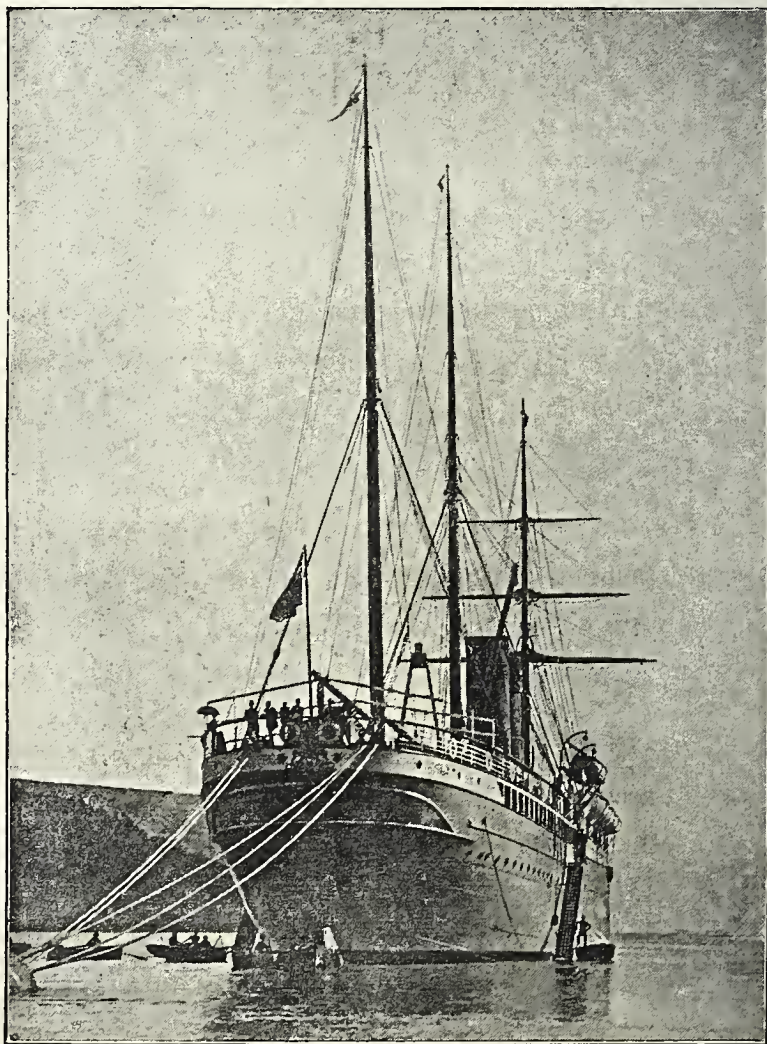
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"Dunne Castle" .....	4,045
"Lismore Castle" .....	4,045

STEAMER.	Tons.
"Pembroke Castle" .....	3,878
"Drummond Castle" .....	3,663
"Garth Castle" .....	3,660
"Grantully Castle" .....	3,454
"Conway Castle" .....	3,056
"Warwick Castle" .....	3,056

STEAMER.	Tons.
"Dunrobin Castle" .....	2,783
"Dunbar Castle" .....	2,608
"Methven Castle" .....	2,305
"Dunkeld" .....	1,158
"Melrose" .....	840
"Venice" .....	511

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largely a closed country ; but the discovery of rich gold quartz in 1884 on the eastern boundary of the Republic in the De Kaap district led to a rush of British into the State at that point chiefly, and the subsequent discovery of the marvellous gold-bearing strata of the Witwatersrand conglomerates led to a further inrush of Englishmen and Europeans, till at the present date the British and Europeans outnumber the original State inhabitants.

With the inrush has come daily contact, and with the contact the Boer Anglo-phobist feeling is fast disappearing.

The balance of political power is at present with the Boers, but a silent revolution is proceeding speedily, and in a very short time the balance will be with the white inhabitants of the State, irrespective of origin. By recent law a limited franchise is open to all adult European residents of two years, and the next Parliament should be a still more representative one.

The country is admittedly the finest in Africa, whether from a pastoral, agricultural, mineral, or residential point of view ; and it is now on the very threshold of an enormous development.

The wealth of the State is practically untouched, but the same impetus to the development of that wealth which was found on the Pacific slope and in Australia is working in the Transvaal, *i.e.*, a large and ever-increasing output of gold. This occurring in the centre of the State, is drawing and employing foreign capital and population, which in their turn overflow from the gold centres through the State generally, thus developing the practically untouched natural riches of the same.

Railways are in active construction within the State itself, and are rapidly approaching it from the surrounding and maritime States. The advent will set free additional industries and add to and guarantee the general property.

The bench and bar of the Republic are chiefly composed of men who have graduated as English Barristers or Cape Advocates. The system of law is Roman-Dutch, with, in commercial cases, a strong adoption of the best principles of English law. Chief Justice Kotze is a jurist of world-wide reputation.

## THE GOLDFIELDS.

The present gold centres are De Kaap (Barberton), Witwatersrand (Johannesburg), Klerksdorp, Vaal River, Malmani, Lydenburg, Zoutpansberg, and Murchison Range.

WITWATERSRAND is the district containing the now famous Main Reef line, *i.e.*, several distinct layers or seams of auriferous conglomerate,—known as banket—varying in thickness from 3 inches to 20 feet, and in richness from a dwt. to 60 ounces to the ton, but averaging about  $2\frac{1}{2}$  feet thick, yielding 12 to 15 dwts. per ton ; the

seams dip south at an angle of about  $40^{\circ}$ , and the beds of ore can be traced on the surface for some fifty miles, running mainly and continuously east and west. The depth of the seams is unknown; they are being mined and milled with rich results from a vertical depth of 600 feet, and from the geological indications a mile deep will not bottom them. The Witwatersrand gold industry is, therefore, based on several  $2\frac{1}{2}$  foot seams of gold-bearing matter going at least a mile deep and running fifty miles east and west; thus the gold contents and tonnage of gold ore are illimitable, and quite beyond the treatment of this generation. The gold won to date has been from surface and next to surface mining, and the seams are practically untouched.

Those seeking corroboration of the facts stated in the preceding paragraph may be referred to the quantity of gold already won and in the expert reports of the many known professional geologists and mining engineers who have specially visited the fields and reported on them. All of these without reservation state that it is the greatest gold field in the world.

This greatest goldfield has so far only given an inkling of its enormous future (as will be seen later on); but its position in the world's markets five years hence and now will be as different as infancy is from fuller growth. In that time the population and industries dependent on it will have increased many-fold, and solely on account of the immense and permanent deposits of gold-bearing matter, which will cost 4 to 7 dwts. to extract 8 to 15 dwts. of gold for every ton of that matter.

The obvious richness of the Witwatersrand deposits created in 1889 a mad spell of speculation, which disorganised things very much, and created many temporary evils; but this is righting itself by a natural reaction, and the ups and downs of the markets and the history of individual ill-conducted mining companies in no way affects the true industrial merits of the fields. The richer the industry the worse are the concurrent frauds.

The fields have passed triumphantly from the prospecting test, and are now being actively developed, and gold-mining proceeds apace on an assured basis.

DE KAAP FIELDS are quite a different formation—*i.e.*, the gold is in quartz reefs. The district contains many splendid mining properties; but the district being mountainous, communications have to be perfected before the known wealth can profitably be dealt with on a large scale. Railway communication is now being established, and well under two years from now, there should be a consequent heavy revival in the mining industry at De Kaap, with a concurrent rise in land and mining investment values.

Malmani, Vaal River, Lydenburg, and other gold centres are barely prospected yet; but actual milling proofs are already

abundant and clear that in all these places the gold deposits are strong enough to create many new towns and occupy a very large amount of people and capital.

The Klerksdorp fields are a repetition of the Main Reef features—*i.e.*, immense deposits of gold-bearing conglomerate, with the difference, however, that little as has been done at Witwatersrand, much less has been done at Klerksdorp. The reef extent at Klerksdorp should yield a heavy continuous gold output, and maintain several towns. The Klerksdorp conglomerates are of lower grade than the Main Reefs series, though geologically identical, and railway communication is therefore of vital importance.

KLEIN LETABA is the name of a new and rich district in the south central part of the State. The gold is distributed over a large area in quartz reefs in Slate Country. The reefs vary much in richness, and crushing is already in operation with very encouraging results. The district is very large, and only fractionally prospected; the finds are, however, of sufficiently positive a nature to cause those on the spot to stick fast to their finds, and to draw new men from the older centres.

Reference has been made to the earnest already given and being given by the Witwatersrand field of present riches and of riches yet to be. The following figures tell their own tale, being the certified production of raw gold from the one field alone during the under-stated periods in ounces, the gold being worth on sale £3. 12s 6d. per ounce.

### WITWATERSRAND OUTPUT TO DATE.

The official output to December 31st, 1892, is as follows:—

—	1887.	1888.	1889.	1890.	1891.	1892.
	ozs. dwts.	ozs. dwts.	ozs. dwts.	ozs. dwts.	ozs. dwts.	ozs. dwts.
Jan. ...	...	7,328 5	25,505 12	35,006 15	53,205 8	84,560 8
Feb. ...	...	12,179 14	22,456 18	36,887 5	50,079 2	86,049 8
March ...	...	11,975 15	27,919 0	37,780 2	52,949 1	93,244 11
April ...	...	14,146 8	27,028 16	38,696 19	56,371 16	95,562 6
May ...	887 3	13,356 18	35,028 7	38,836 5½	54,673 1	99,436 3
June ...	734 0	12,773 5	30,877 13	37,419 10	55,863 1	103,252 3
July ...	240 0	16,686 17	31,091 2	39,456 14	54,924 10	101,279 1
August	1,408 15	18,615 19	30,519 14	42,863 11	59,070 4	102,322 3
Sep. ...	1,935 19	20,242 4	34,143 10	45,485 19	65,601 15½	107,851 13
Oct. ...	4,029 0	27,165 6	32,214 6	45,248 17	72,793 8	112,167 8
Nov. ...	5,463 3	26,826 17	33,721 16	46,782 18	73,393 15	106,794 15
Dec. ...	8,457 8	26,784 6	39,650 11	50,352 5	80,312 11	117,748 3
	23,155 8	208,121 14	369,557 5	494,817 0½	729,238 6½	1,210,868 2

Total output to date 3,035,757 ozs. 16 dwts.



In 1885, the Witwatersrand area was uninhabited, with neither a building, a mine, nor a battery. The place was practically in the wilds; some five hundred miles from any seaport. There is now the nucleus of an enormous industry, and one large well-built town (Johannesburg) with some 40,000 inhabitants, and several smaller towns. At the inception of the industry, all the food-stuffs and mining material had to be brought to the spot by ox teams at extravagant prices, and the gold that has been won, has, till recently, owing to the non-mining class of people who owned and ran the mines, cost practically almost as much as it realised. Railway facilities, added to expert mining, are reducing cost of production 50 per cent., and expert metallurgy is increasing percentage of gold saved by 25 per cent. Those two factors together make for a development within the next few years which will astonish the gold consuming world.

Johannesburg is connected now by rail with three seaports—Cape Town, 1,013 miles, Port Elizabeth, 713 miles, East London, 665 miles—and soon the town will be connected with two other ports, Durban, about 420 miles, and Delagoa Bay, about 400 miles. Local railways are developing local trade and coal fields, and connecting new towns and villages with Johannesburg.

In reading these figures their true merit and value as indicators lie in the fact that the figures apply to the one goldfield of Witwatersrand alone, which was unknown as a goldfield till 1886-7, and are quite apart from the output of the other Goldfields, viz., De Kaap, Malmani, Zoutpansberg, Klerksdorp, Komati, Vaal River, &c.

The merit—phenomenal merit—of these figures will be best found by contrasting them with the results being obtained in other countries, say such old gold-producing territories as the United States of America, after a century of development; Australia, after nearly half a century of development; and Russia, after hundreds of years of working. It will be seen that the young and barely-scratched Witwatersrand field is rapidly overtaking those countries; and in no case is the Rand output anywhere nearly approached, let alone beaten, by any other single field in the world; and more important still, in no other mining district the wide world over, are there to be found such patent proofs of immense immediate and future wealth. The tonnage of high pay rock in sight is practically incalculable, and it is simply a question of mechanical extraction, whether the chronic monthly output of gold is 4,000 ounces, 40,000 ounces, or 400,000 ounces.

In other gold mining centres where gold is won always from quartz, owing to the erratic disposition or formation, the continuity of the lodes is ever a matter of doubt, and the investment in such mines is well viewed as a mining speculation.

In bedded deposits of the unique nature and great extent of the conglomerate seams of Witwatersrand there is neither contingency nor doubt, for there are all the solid accompaniments analogous to the great English and Continental coal seams. The total tonnage, extracted in either case, is solely a matter of machinery and mine development, and added to these solid advantages, there is the further one, that the ore is not only illimitable in quantity, but payable in quality, and in value unfluctuating. Thus mining at Witwatersrand can be made a mining investment instead of a mere mining speculation, as is the case elsewhere.

The evident deduction is, that with such prospects of gold output, the rapid development of the State from its present primitive prairie status, to that of a full-pulsed, prosperous, busy, and populous territory is assured, and that the chances for safe and remunerative investment and colonization are, and will for years to come be, exceptionally good.

#### OTHER RESOURCES.

So far the gold deposits of the State alone have been considered, for it is the gold industry that will, in proportion to its value and importance, make the pace for the development of other industries. Silver, lead, coal, copper, iron, petroleum, and cobalt deposits are abundant in the State, but owing to deficient population, capital, and to British-Boer racial feeling, and to inadequate means of communication, these industries have hitherto been neglected, although one and all are now fast coming to the front. The arable lands are enormous in area, and of good quality, and in different parts suitable to the economical growth of tea, coffee, sugar, grain, corn, and wine, alike for the supply of South African needs, and for export.

#### CLIMATE.

Over seven-eighths of the State the climate is in every way adapted to the specially healthy existence of Europeans.

Sober, shrewd artisans, and farmers with wives and families, cannot have a healthier climate to seek and win fortune in, and found permanent homes in.

The temperature of the Witwatersrand goldfields and the high veld, which lie at an elevation above sea level of 5,000 to 6,000 feet, is never in excess, neither hot nor cold, the summer and winter alike being in every way suited to European existence and work, as in the temperate latitudes of Europe; the malaria and heat of the subtropical coast belt is only found in certain portions of the low-lying bush veld near the North-East.

## RAILWAYS.

The railway policy of the Transvaal Government has practically been to have no railways at all, the reason for this having been the past wish of the Boer population to keep their State isolated. This wish was based on the fear that if railways ran into their State their independence would end.

Last year, however, the Boers changed with the times, and the beginning of a liberal railway development has been made in the consent of the Raad for the connection with the south by means of the Natal and Cape Junctions, via the Orange Free State. The latter line has now been completed.

The extension of the Natal main line from the south-eastern border of the State to Johannesburg and Pretoria is being surveyed, via the rich districts of Wakerstroom, Standerton, and Heidelberg.

There will soon also be a line connecting from the Cape-Mafeking line, via Malmani, with the Pretoria terminus, opening up the grain and mineral districts of Rustenberg, Marico, and Malmani.

A local or State line from Pretoria to Nylstroom and the Waterberg is decided upon, and a line to open up East Central Transvaal is now in active construction, via Komati and Silate Rivers, whence it will strike north to Manica. In this way the speedy opening of the mineral wealth in the North will soon be accomplished.

The Main Trunk line now in active construction runs from Delagoa Bay on the east coast through the best district of the Transvaal to Pretoria, thence to Johannesburg, and thence to the Free State border, 35 miles south, connecting Delagoa Bay with the ports of East London, Port Elizabeth, and Cape Town.

The extension of the line from Natal is in hand, the remaining 120 miles of this line being now under survey.

Thus the whole State is on the verge of an enormous development of all its varied wealth, all of which will chiefly take place before the close of 1899, when the difference in values, then alike of country and town landed properties, of mines and of industrial ventures, should be great when compared with those obtaining now.

The Cape Government railways have earned over 6 per cent. on their capital after payment of all working expenses. The Natal Government railways in the same period earned £7 15s. per cent. over the working expenses, and for the previous year over 5 per cent. These increasing earnings arise solely and wholly from the development of the Transvaal, as both railways are the carriers of the Transvaal trade.

The railway mileage and tariff to Johannesburg when open show a freight charge of £8 per ton from the seaport. At present it

averages about £20 per ton by ox wagons, and the saving on the amount actually carried to Johannesburg in 1889 would have been £1,600,000 had the railway and not the ox wagons done the carrying. This item is but one of several, which now will make for chronic dividends.

The Natal line is over the Drakensberg, at the Charleston terminus, on the Transvaal Plateau, with about 120 miles of level country to be laid with rails to Witwatersrand. When the railway is completed to Charleston a very large saving in cost of all things will take place in the Transvaal; and now that the railway has reached Witwatersrand the cost of mining and of living should be steadily reduced to as low a level as obtains in railroaded countries.

### WITWATERSRAND CHAMBER OF MINES.

This useful and influential body was constituted in 1890, and is in the nature of a mining union, *i.e.*, all the mining interests contribute to a common fund, which, in the interests of the mining industry, is administered by a Council nominated and elected by ballot from the best men in the local mining world. Thanks to the Chamber the public are now being placed increasingly in possession of specific information respecting the various mines, their output, costs, &c. The Chamber is essentially a mining chamber, and has nothing to do with Stock Exchange speculation, or individual mines, but aims at furthering the economic production of gold, and conserving the rights of those employed in that production.

The constitution of the Chamber provides for the enrolment of foreign members, who, in return for a small annual fee, are entitled to the statistical publications of the Chamber and to access to the officials of the Chamber for general information. For full particulars address the Secretary of the Chamber, Johannesburg, Transvaal.

On page 4 is a typical specimen of the monthly returns issued by the Chamber.

### LAND TENURE.

The equivalent of English fee simple in freehold is a quit rent title, *i.e.*, lands are held in freehold by their owner subject to a peppercorn rental to the Government annually; any white man can own land and transfer, buy, sell, or lease at will; sales are liable to a transfer duty to the State of 4 per cent.

Land on preclaimed areas (*i.e.*, Goldfields), is held either under mining license or squatting license. A Mining Claim is 150 Cape feet along the strike, and 400 feet on the dip or underlay. On



proclaimed areas the first in time, irrespective of persons so long as he is white, can peg off, and his title is absolute on payment of the Government dues of 7s. 6d. or 15s. a month, according as he may elect to be a prospector or digger.

Squatting or residential stands are 50 feet by 50, or 50 by 100, and same are sold by State Auction, at a low upset price on a 99 years' lease, subject to a monthly ground rental of 7s. 6d. to 15s.

All the Goldfield towns are established in this way, and in Johannesburg stands not worth an upset price of £10 seven years ago are now built on and worth over £10,000. Workmen buy stands and build their own houses. Several successful Building (Co-operative) Societies exist.

### POLITICAL TROUBLES.

Emigrants to the wide unreclaimed expanses of mineral, industrial, and agricultural wealth in the Transvaal are sometimes deterred by the fear of political troubles. No such fear need exist.

The Boer is of like race and temperament with ourselves, slow to act, and strong for fair play, and so long as the new population acts squarely by the Boer pioneers, nothing but united effort and united Government need be looked for. New comers are not given a vote the moment they put foot in the country, but, when they settle down prepared to make the country their home, the vote will not be wanting.

### LEGAL RIGHTS.

An English emigrant going to the Transvaal will find himself as safe as in England so far as the liberty of the subject goes, the difference, if any, being in favour of the Transvaal. The law for Boer pioneer and English emigrant is the same; there is no distinction of persons. Land, mining, trading, craftsmanship, and all the walks of life are as free as air to those who ask to earn their living and a competence. The law of the land is Roman-Dutch as regards local inheritance; contract law is practically the same as in England. Trial by jury is open to all.

### CURRENCY AND BANKING.

English money, gold, silver, and copper is recognised currency. There are three English Banks, a State Bank, one Colonial (Natal)



Bank, and two Holland Banks, all competing for the money and finance of the State. Interest on fixed deposits is 4 per cent., the charge for discount 8 per cent., while the exchange to and from London varies from  $\frac{1}{8}$  per cent. to 1 per cent. Remittances to and from the Transvaal are cheaply made, and can be done, if need be, by cable.

### WAGES.

The current wages paid throughout the Transvaal are roughly as follows :—

						£	s.	d.
Skilled Stonemason	...	...	...	...	per day	1	10	0
Medium	„	...	...	...	„	1	0	0
Skilled Carpenter	...	...	...	...	„	1	10	0
Medium	„	...	...	...	„	1	0	0
Underground Miners	...	...	per week	£4	0	0	to	5 0 0
Foreman Quarrier	...	...	„	5	0	0	to	7 0 0
Surface Men (Mines)	...	...	„	3	10	0	to	5 0 0
Engine Driver (Mills)	...	...	„	5	0	0	to	7 0 0
Amalgamators ( „ )	...	...	„	3	10	0	to	6 10 0
Blacksmiths	...	...	„	5	0	0	to	7 0 0
Bricklayers	...	...	„	5	0	0	to	6 10 0
Skilled Accountants	...	...	...	per month up	to	40	0	0

For clerks, “all-round” men, retired Army men, Physicians, Lawyers, &c., there is no demand.

### COST OF LIVING.

At Johannesburg and Pretoria house rents vary from 30s. a week for a small cottage up to £30 a month for a large house.

Water is laid on at a cost of 20s. to 50s. a month, according to the quantity consumed. Gas and electricity are now in course of supply by a powerful company. The general cost of living all round is about, and not more than, double the cost of the same persons in England. Against the double cost of living comes the fact that wages are more than double.

### RELIGIONS.

Church of England, Presbyterian, Wesleyan, Roman Catholic Baptist, and minor sects all have their organisations, churches, etc.,

and thrive midst the British communities ; Jews have their Synagogues, and Moslems their Mosques. People can worship as they like, and the Salvation Army is in strong force in several of the towns.

### THE WORLD'S GOLD.

Nothing brings the phenomenal wealth of the New Transvaal into such prominence as contrasting the gold won by the different gold-producing countries of the world.

We may tabulate the world's annual efforts for 1891 thus :—

	Ounces.
Whole of the United States of America ... ..	1,597,344
Whole of Russia ... ..	1,025,664
Whole of Australasia ... ..	1,315,808
The one State of Transvaal ... ..	840,000

Marvellous as the figures for the Transvaal are, it must also be recollected that America, Russia and Australasia have been mining gold for many years, fifty or more, and that for several lustrums their out-put is either stationary or retrograde, whilst the Transvaal is ever upward and onward, every month gaining steadily on the previous month.

### EMIGRANT'S OUTFIT.

The range of temperature in the Transvaal is much the same as in England, and, therefore, ordinary English clothing is all that is required.

As to furnishing houses, those who can afford to furnish a house throughout can do it more cheaply by buying in Europe ; those who have second-hand furniture of no special value should realise all bulky things, and take only the compacter, smaller things, as linen and cutlery, knicknacks. Artizans should bring their tools.

Farmers, stock or arable, should spy out the land and serve a year, quietly studying climates, soils and growths before deciding to bring out families or embark capital. There is an enormous field for profitable agriculture, and for good stock farming. Artizans and workmen need no spying-out ; they may have to bide their chance for a short time but their foot once on the rung their height on the common ladder rests with themselves.

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2. EXTRACTS *from a Report on the Witwatersrand Gold-fields prepared by Mr. HAMILTON SMITH, the well-known American mining engineer, which appeared in "The Times" of 17th January, 1893. (Reprinted by permission.)*
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The following statements are based upon my observations during a visit to the Transvaal in the past months of August, September, and October.

The country south of the Witwatersrand is a rolling and treeless table land for a distance of some 35 miles to the Vaal River, the boundary between the Transvaal and the Orange Free State; Johannesburg being about 5,600 feet above sea level and the Vaal 4,300 feet; to the south of the Vaal are gently ascending hills. The geological formation is a basin deposit of sandstone, which has been transformed by heat and pressure into a firm quartzite, but which in nearly all cases retains the planes of original stratification; in this quartzite are many beds of conglomerate, varying from a few inches to 20 feet or more in thickness, the pebbles being generally of quartz; these beds appear to be nearly "truly conformable," that is to say, nearly parallel with each other, and with the stratification of the quartzite. Through this general formation very many small dykes of greenstone occur, apparently filling up original fissures in the earth's surface; running east and west, and nearly parallel at a distance of four or five miles from the northern margin of the basin, there is a huge dyke of amygdaloidal greenstone from two to three miles in width, which can be traced for a distance of more than 20 miles. The basin has a length east and west of say 50 miles; its northern boundary is roughly the Witwatersrand, where the outcrops of the beds of conglomerate are the most regular; on the eastern and western margins, the formation has been greatly faulted and twisted; the southern outcrop has not yet been determined, but is probably in the Orange Free State, some miles south of the Vaal River. The trough of the basin I conjecture to be fully 15,000 feet in vertical depth below the surface, and very likely

much more; its geologic position is believed to be just under the carboniferous series, being about the same as that of the millstone grit in England and elsewhere; in fact the formation closely resembles an English coal basin, only that the beds are of conglomerate instead of coal, and that dykes of intrusive rock are far more frequent.

Gold is said to be found in all these many beds of "banket," but as a rule only in small quantities, except in two or more of the inferior (lower) beds, which are called the "main reef series"; the gold is found adjoining the individual pebbles, but not in the pebbles themselves, nor in the quartzite, nor in the occasional quartz lodes which traverse the district. Much prospecting work has been done on the upper and poorer beds, but at the present time I think only one of the many mines upon them is being worked at a profit, and in fact most of them have been practically abandoned; possibly as prices of labour, &c., cheapen, they may yield gold in considerable quantities; they doubtless contain very many million ounces of gold, but the average value per ton seems to be too low for general working.

My studies were chiefly confined to the "main reef series" on the central and northern portion of the outcrop, including all the mines between the "Langlaagte Block B" and the "Glencairn," and having an aggregate length of 58,500 feet—about 11 miles. Within these limits the formation is more regular than on any other portion of the many miles thus far traced on the margin of the basin, and from this section has come about two-thirds of the Rand's total product of 3,070,000 ounces of bullion to date. This 11 miles of outcrop is owned by 36 companies, runs nearly East and West, and the beds have a general dip of say 35 deg. to the South; there are many small greenstone dykes crossing at all angles, but which rarely disturb the adjacent "banket"; in the total distance of 58,500 feet thus studied, perhaps 3,500 feet has been cut out by these dykes, and another 5,000 feet has thus far seemed to be too poor to work, so that mining has been confined to about 50,000 feet in length, and generally upon two beds of "banket" not very far apart; the average distance on the dip exhausted for this 50,000 feet up to August 1, 1892, I considered to be about 160 feet, the average thickness extracted and sent to the mills, about 5 feet, the number of tons (2,000 lbs. each) crushed say 3,000,000, and the total yield (making a reasonable though not large allowance for gold in tailings yet to be extracted) 1,910,000 ounces of bullion, containing £6,700,000 in gold. This is an average yield of  $12\frac{1}{2}$  pennyweights per ton, and is considerably less than the results given by the published accounts of the various mines. Up to 1891 the tendency was to report a smaller tonnage than that actually crushed in order to show a better yield per ton,

but now there is a healthy rivalry between the various superintendents as to costs of mining and milling per ton, so that the present official reports give with fair accuracy the actual tonnage. For such a continuous length the foregoing record is unequalled in the history of gold mining. There have often been mines of short length far richer than these of the Rand, but nothing approaching them has ever been seen so far as regularity and extent are concerned.

The future product of the Rand practically depends upon four things:—

First.—Will the “main reef series” continue to great depths?

Second.—If they do, what will be their general inclination or dip, and to what vertical depth will it be practicable to work them?

Third.—What amount of gold will be found with increased depths?

Fourth.—On how large a scale can mining operations be conducted?

As to the first query, I think it is as certain that the beds will continue clear across the basin, although interrupted by dykes of intrusive rock, as is the case with seams of coal; some of the mines have already reached vertical depths of from 400 to 600 feet without any notable change in the position or character of the beds. Boring by diamond drills shows the same uniformity to depths of from 700 to 1,000 feet, and the general regularity of the surface stratification for three or four miles south of the district I studied is most noticeable. These facts impress one with the conviction that the “banket” deposits are remarkably regular.

In my judgment the second query can only be answered by a careful examination of the stratification of the surface rocks to the south of the outcrop. These as a rule show a general dip of about 35 deg. for nearly two miles, which gradually flattens until the great greenstone dyke before described is reached. I assume, therefore, with considerable confidence, that 35 deg. will be the general dip until such a depth is reached that the cost of mining will become prohibitive. Some experts have been of the opinion that there may be “step” faults whereby the various series, after dipping down to considerable depths, are lifted up abruptly, but I saw no indications that this was probable. Others assume that the “banket” will become nearly flat at vertical depths of 2,000 or 3,000 feet, but I also think that this view is not justified by the facts now known. The depth to which it is practicable to work mines often depends upon the amount of water to be pumped, but as in the Rand coal for fuel is abundant and cheap, neither the cost of pumping probable flows of water, nor the cost of hoisting the ore, etc., is likely to preclude working at great depths. The interior heat of the earth, I think, is the chief element to be considered in this connection; this varies greatly in different parts of the world. At



the *maximum* depth of 3,300 feet reached in the great Comstock lode the heat was almost unendurable, while at the Calumet and Hecla copper lode the temperature is not troublesome at 2,800 feet, and a shaft is there now being sunk with a contemplated final depth of 5,000 feet. The Dolcoath Tin Mine is the deepest in England, I believe, the lowest workings now being some 2,800 feet below the surface, and the heat there is not excessive. Taking all the facts into consideration, I fancy it will be safe to assume that an average vertical depth of 3,000 feet can be reached in the Rand. With this depth and a dip of 35 deg. there would be an hypotenuse of 5,200 feet to be worked on the "main reef series" in this particular stretch of 11 miles.

The third question is, of course, the most serious of all, and the most uncertain, and to its elucidation I gave very careful attention. The croppings of the beds beyond doubt average a somewhat better yield for the first 20 or 40 feet in depth than did the deeper ore, but this, I think, came from an artificial enrichment due to natural washing of the original croppings, and leaving behind in the present soft and oxidized surface a notable quantity of gold which had originally been *in situ* higher up. After a thorough study of this question, and comparing the yield from the various mines for the different years, I came to the conclusion that while the ore in some of the mines had become a little poorer, in others there had been a slight improvement, but taking it for all and all the general average yield has remained practically unchanged. A number of borings have been made, in some of which very rich ore was found at depths of 700 feet and upwards, but it would be dangerous to draw any general conclusions from such tests. The common opinion at Johannesburg has been that the "reefs," as they call them, improve in value with greater depth, but I failed to find any distinct evidence in support of this belief. On general principles, with such a great linear extent of croppings fairly uniform in gold contents, it seems highly probable that the gold contents will continue much the same to such a comparatively shallow distance as 5,200 feet upon the dip of the beds.

The laws under which mines are held in the Transvaal determine largely the answer to the fourth and last query; there "square" locations are granted, each claim being 150 by 400 Dutch feet, with a licence, payable monthly, for each claim. The possessor of a claim is entitled to work all the minerals underneath the limits of his boundary, but he has no rights or privileges to adjoining claims, which may be held by other locators. This is the same method as that followed under the old Spanish law in the Americas. In the United States an apparently fairer method was introduced, the locator of a vein having the right to follow it down to any depth, the boundaries therefore being only on the side lines. Although

the latter law is theoretically more just, experience in the United States has shown that it has often given rise to most costly litigation owing to the difficulty of defining the lodes, and I feel satisfied that it would have been vastly better for the general mining interests of the country had the Spanish custom been followed. The first prospectors in the Rand had very little idea as to the true theory of the formation of the "reefs," and as a rule only located claims near their outcrop. These claims form the estate of the various companies now in most active operation. More active-minded men began to see that the beds were continuous and on a moderate inclination, and "pegged out" claims on the dip, until now claims have been located to a distance of more than a mile below all the chief producing mines. These lower claims are called "deep levels," and it is proposed to develop them by sinking vertical shafts until the "banket" is reached, and then to mine the ore just as an ordinary British colliery is worked. Already a number of these shafts has been started, and one group of capitalists proposes to expend fully £1,000,000 upon development and plant for some of these "deep levels." If these first deep shafts prove successful, and show that the theories I have attempted to develop are correct, then many more shafts will be sunk, and thus many new producing mines will be brought into existence. The coal, or iron, or copper, or diamond, or even silver miner has always to take into account the commercial side of the industry, and over-production is his bane. Gold is now the only material for which there is a practically unlimited demand, so the Rand mine-owners begin to see that it is better for them to work their "banket" with greater vigour than they have been doing in the past; in other words, a gold mine is nearly twice as valuable if it can be exhausted in 20 years, than were 40 years taken to produce the same gross yield.

Supposing my belief in the uniformity of the beds and their gold contents to be correct, the mine-owner will be justified in erecting plants of a capacity before unknown in the history of gold mining. The question of profit is foreign to the purpose of this article; but as it is of importance to the question of product, it may be stated that 21 of the 36 surface mines especially examined by me are now being operated at a profit, and of the remaining 15 several bid fair to soon become profitable. This ratio of paying mines is sufficient to insure the working of all, and they will all assuredly be followed down in depth until the working costs exceed the yield.

Coming to the total quantity of gold which the Rand may be expected to yield, we have for the stretch of 11 miles particularly discussed a paying length of 50,000 feet, a probable thickness of fully five feet, and an inclined depth of 5,200 feet. This aggregates 100 million tons, of which three million tons have been mined; the remaining 97 million tons, at an average of  $12\frac{1}{2}$  dwts. per ton, would

yield 60 million ounces, having a gold value of £215,000,000. I do not think it at all unreasonable to estimate that the many miles of "banket" outside of this district of 11 linear miles will yield at least one-half of this amount, or, say, £325,000,000 in all. This seems a huge figure, but it is by no means a wild conjecture, and the final results will probably exceed even this sum. The large State of California, with gold almost from one end of it to the other, produced only £230,000,000 in gold from 1849 to 1852. This fact gives one an idea of the richness of these few square miles embraced in the Rand.

With the active and energetic set of men who now have this industry in hand, and always supposing that the foregoing theories prove to be exact, in three or four years from now the producing power of the mines and their reduction works will, I think, be increased to an output of five or six million tons of ore per annum, with a gross yield of over £10,000,000. At this rate the available supply of ore, as conjectured above, will last for more than 30 years, and the world's yearly product will have increased from £19,000,000 in 1883 to, perhaps, £30,000,000 in 1897.

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3. EXTRACTS *from an interview with Mr. J. B. TAYLOR of Johannesburg, which appeared in the "Pall Mall Gazette," of January 18th, 1893. (Reprinted by permission).*
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#### THE GREAT TELEGRAPH SCHEME.

With Mr. Cecil Rhodes, Sir Henry Loch, and Sir James Sive-wright so recently among us, Mr. Taylor modestly hinted that he could not have anything fresh to say on South African questions; but asked as to how the Premier's transcontinental telegraph scheme had been received, he replied that the cabled announcement had had a most favourable reception. "I believe many subscriptions will be obtained in the colony. We do not think it at all impossible. The line will be carried through to Uganda, at any rate, without any trouble. We have experience with the natives, and we do not find that they interfere with the telegraph lines. We have a network of lines through South Africa, going as far up as Fort Salisbury, and they are never tampered with. Otherwise there can be no hitch. As to the Mahdi, he is not always going to be an obstruction."

"Commercially, do you consider the line is needed?"—"Of course it is. We are paying now very high rates—8s. 9d. per word, is it not?—and Mr. Rhodes can do it for a fourth of that if the line can be constructed for £400,000 as he estimates. It is a good commercial enterprise; I know none better. By subsidising the chiefs of the different native tribes the line can be very well protected. The country to be traversed will be settled in a very few years. Look how rapidly South Africa is being opened up!"

"The native troubles, you think, are at an end?"—"The natives are being hemmed in, and they are very contented in their locations. They were never happier in the Transvaal than they are now. There is much more prosperity among them. They are richer and in much better condition than they ever were before. We have brought them labour and high wages. After working at the mines they go back to their homes with the new moon. You will see them trekking along the roads in hundreds, every one carrying a pack on his back between 60 lbs. and 70 lbs. in weight. These bundles contain blankets, clothing, and implements of various kinds. They come and go, and are perfectly satisfied. You will find the same 'boy' working for you repeatedly."

#### NO REAL GRIEVANCES.

"As to politics in the Transvaal, how are things going?"—"Oh, very smoothly. As to the election of President, General Joubert is not moving himself, although a strong party is canvassing for him."



He has stated that if they care to elect him he will serve, but he will not do anything against President Kruger. There is no likelihood of a split among the Boers, as that would endanger the independence of the country.

"What of the English claims to the suffrage?"—"We cannot fairly expect a very liberal franchise extended to us just yet. The Boers say, very rightly, 'You have not been sufficiently long in the country; we cannot judge whether you would maintain our independence or not; and until we are satisfied about that we cannot grant the franchise.' Besides, there are very few men in the country at the present time who are in a position to accept office. There is a section who want to be enfranchised at once, and make themselves heard, but they have no permanent interest in the country, and people with that interest would not accept office at present."

"Have you any really practical greivances?"—"I think in several of the executive departments changes could be beneficially made, and I believe these changes will be made by the time the next Volksraad meets. Several complaints were brought against heads of departments at the last sitting of the Volksraad, and inquiries were ordered. The country has progressed so much that we really need men with wider experience and larger intellect."

"Does the taxation interfere with the progress of the mining industry?"—"Not in the least. So far as mining is concerned there is no restriction. The Government have met us in the fairest possible manner. Our greatest difficulty was the dynamite monopoly, and that we have succeeded in crushing. Pending an arbitration between the concessionaires of the monopoly and the Government, permission was granted to the French, German and English Powers to import 15,000 cases of dynamite each. The arbitration case will unquestionably be settled in favour of the Government, when they have promised to grant free trade in dynamite."

## TWO HUNDRED THOUSAND OUNCES A MONTH.

"And how is the industry itself going on?"—"The industry was never more prosperous, and there is a future before it which it is almost impossible to exaggerate. I spent a fortnight before I came away on the Randt, going through the principal mines, and I was astounded at the developments going on. We are really only commencing to mine at Johannesburg. We are coming across new lodes every day which we knew nothing about a few years ago. The fact is, speculation was so rampant that people more or less abandoned mining for the share market. Now that they are steadily at work they are finding what the true value of the Randt is. We have hitherto only been working on the surface, on the outcrop, and now that the deep levels are being opened up we find that the reefs are richer at 700 ft. or 800 ft. than at the top. When the development



has been completed, and we are able to crush from these deep levels the output from the field will undoubtedly double itself. The only company that has so far been working at this deep level is the Village Main Reef, and its crushing has been very good."

"So you are certain of a great expansion?"—"Undoubtedly. An enormous amount of capital will be directed to Johannesburg, and there will be a large influx of people. We have now a town of forty to fifty thousand inhabitants. Inside of five years it will be doubled or trebled, and the field will be able to carry that population."

"Has much machinery gone up since the railway was completed?"—"A great deal."

"So there will be no falling-off in the output?"—"No, there will be a steady increase. I think it is certain that the present output will be doubled within three years. We shall be turning out by that time 200,000 ozs. a month."

"The number of dividend-paying companies is on the increase?"—"The number is certain to be larger this year. Good solid work is being done. All mining men—Americans and others who have had the greatest mining experience—say that the work done is phenomenal. There is no place in the world where such an amount of 'footage' has been effected in the time. And they also agree that there is no goldfield in the world to compare with it. The proof of that is that some of the best experts are settling down there with their families. It has a glorious climate, of course."

#### GOOD REPORTS OF MASHONALAND.\*

"Now what do you people in the Transvaal think of Mashonaland?"—"Our first idea is that Mashonaland must get direct communication with the coast before anything great can be done, but at the same time we consider that it will become a permanent colony. A great many Johannesburg people would have gone north in ordinary circumstances, but they said, 'we have such a good thing here, why go in search of anything problematical?' Otherwise, Mashonaland would have been heavily rushed from the Randt and the Transvaal generally. Development must be comparatively slow. I have had considerable experience in new countries and have been through many mining camps, and I know that it takes a long time and a great deal of patience before a place is thoroughly prospected and developed. I came home with two gentlemen who have been in Mashonaland, and they gave me a most satisfactory account of the goldfields. They had been working the reefs for some time, and also milling and their reports are therefore to be relied on."

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\* The British South Africa Company's Cape Town Agents have communicated the gold returns from the following districts up to the end of November last:—Umfuli, 699 oz.; Mazoe (September and October), 49 oz.; Manica, 15 oz.; and Victoria, 490 oz.

# OPENING OF THE RAILWAY TO JOHANNESBURG AND PRETORIA.

## ROUTES TO THE GOLDFIELDS.

### THE TRANSVAAL GOLDFIELDS.

FROM CAPETOWN, ALGOA BAY AND EAST LONDON *viâ* BLOEMFONTEIN.—This is a very comfortable and expeditious means of reaching the fields. From Cape Town, Algoa Bay or East London, travellers proceed by rail *viâ* Bloemfontein to Johannesburg and Pretoria.

*Viâ* NATAL.—This is a convenient route to the Transvaal Goldfields, and occupies about 50 hours. The journey is performed by rail from Durban to Charlestown, 303 miles, and thence by post-cart, coach, or wagon to Barberton, Johannesburg, Moodies (De Kaap), or the other mining centres. This line is also being extended towards Johannesburg.

*Viâ* DELAGOA BAY.—Passengers proceed by rail to Krokodilpoort for the Barberton Goldfields, and to Nelspruit for the Lydenburg and Witwatersrand Fields.

The following table will show approximately the distances, time occupied, and cost of travelling by these routes. The fares by coach vary considerably from time to time. Beside the coaches, much cheaper ways of travelling are afforded by wagons.

CAPE PORTS AND BLOEMFONTEIN ROUTES.	Miles.	Hours.	FARES.		
			1st Class.	2nd Class.	3rd Class.
			£ s. d.	£ s. d.	£ s. d.
Capetown to Vryburg, by rail . . . . .	774	39	8 11 4	5 17 8	3 4 8
Capetown to Johannesburg, <i>viâ</i> Bloemfontein . . . .	1,013	50	11 12 0	7 19 10	4 8 8
Algoa Bay to Johannesburg, by rail . . . . .	713	50	8 4 0	5 14 5	3 3 8
East London to Johannesburg, by rail . . . . .	665	37	7 13 0	5 6 0	2 19 8
Vryburg to Salisbury, by road . . . . . about	966	—	—	—	—
Johannesburg to Pretoria, by rail . . . . . about	30	2	—	—	—
Pretoria to Barberton, by road . . . . .	240	—	—	—	—
<b>NATAL ROUTE.</b>					
Durban to Charlestown, by rail . . . . .	303	21½	3 2 6	2 1 8	1 0 10
Charlestown to Johannesburg, by coach . . . . .	130	29	4 10 0	—	—
Charlestown to Barberton, by coach . . . . .	190	—	—	—	—
<b>DELAGOA BAY ROUTE.</b>					
Delagoa Bay to Krokodilpoort . . . . .	56	8	1 8 6	1 2 0	—
Delagoa Bay to Nelspruit, by rail . . . . .	129	—	—	—	—
Krokodilpoort to Barberton, by coach . . . . . about	40	—	1 10 0	—	—
Nelspruit to Lydenburg, by road . . . . .	50	—	—	—	—
Nelspruit to Pretoria . . . . . about	221	—	—	—	—

Tickets for the railway journey from the Cape Ports, Durban or Delagoa Bay and for the coach journey from Charlestown to Johannesburg, &c., can be obtained from Messrs. Donald Currie & Co.

### THE MASHONALAND GOLDFIELDS AND THE TERRITORY OF THE CHARTERED BRITISH SOUTH AFRICA COMPANY.

One route to this Territory is by rail from Capetown to Vryburg or Pretoria (see above), and thence by wagon or coach. The railway is being rapidly extended towards Mafeking and Shoshong. The shortest land route is that *viâ* Beira, on the East Coast, with which port a fortnightly connection is maintained by the Castle Mail Packets Company's steamers from Natal. The railway from Beira towards Fort Salisbury has been laid as far as Masakessi.

	Miles.	Hours.	FARES.		
			1st Class.	2nd Class.	3rd Class.
			£ s. d.	£ s. d.	£ s. d.
Capetown to Vryburg . . . . .	774	39	8 11 4	5 17 8	3 4 8
Vryburg to Salisbury . . . . .	966	—	—	—	—
Beira to Masakessi . . . . . about	240	—	—	—	—
Masakessi to Salisbury . . . . . about	160	—	—	—	—

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